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NUREG-0857
Supplement No. 2

Safety Evaluation Report

related to the operation of Palo Verde Nuclear Generating Station, Units 1, 2, and 3

Docket Nos. STN 50-528, STN 50-529, and STN 50-530

Arizona Public Service Company, et al.

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U.S. Nuclear Regulatory Commission

Office of Nuclear Reactor Regulation

May 1982

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1 INTRODUCTION AND GENERAL DISCUSSION

1.1 Introduction

On November 13, 1981, the Nuclear Regulatory Commission (NRC) staff issued its Safety Evaluation Report (SER) relating to the application for licenses to operate the Palo Verde Nuclear Generating Station, Unit Nos. 1, 2 and 3 (PVNGS 1-3); Supplement No. 1 to the SER was issued on February 4, 1982. The application was submitted by the Arizona Public Service Company (APS or the applicant) on behalf of itself, the Salt River Project Agricultural Improvement and Power District, Southern California Edison Company, El Paso Electric Company, Public Service Company of New Mexico, Los Angeles Department of Water and Power, Southern California Public Power Authority, and M-S-R Public Power Agency.

In the SER and Supplement No. 1, the staff identified certain issues where either further information was required of the applicant or additional staff effort was necessary to complete the review of the application. The purpose of this supplement is to update the SER by providing (1) the evaluation of additional information submitted by the applicant since Supplement No. 1 to the SER was issued, and (2) the evaluation of the matters that the staff had under review when Supplement No. 1 was issued.

Each of the following sections of this supplement is numbered the same as the section of the SER and Supplement No. 1 that is being updated and, unless otherwise noted, the discussions are supplementary to and not in lieu of the discussions in the SER and Supplement No. 1. Appendix A to this supplement is a continuation of the chronology. Appendix B is the list of principal contributors to the staff review. Appendix C is the errata to the SER.

1.9 Summary of Outstanding Issues

Section 1.9 of Supplement No. 1 contained a list of outstanding issues. Three of those issues were resolved after the issuance of Supplement No. 1. These are listed below, along with the section of this supplement wherein their resolution is discussed.

(1) Dynamic effects of pipe rupture (3.6.1, 3.6.2)
(2) Containment pressure analysis (6.2.1.5)
(3) Financial qualifications (20)

At this time, a number of outstanding issues remain to be resolved. These are listed below along with the section of the SER and/or its supplements wherein each issue is discussed. The resolution of these remaining issues will be addressed in a subsequent supplement to the SER.

(1) Emergency preparedness (2.3.3, 13.3)
(2) Ultimate heat sink (2.4.4.2, 9.2.5)
(3) Cable tray design (3.7.1)
(4) Seismic and LOCA loads (4.2.1)

(5) PSI/ISI program (3.9.6, 3.9.7, 5.2.4, 6.3.3, 6.6)
(6) Equipment qualification (3.10, 3.11)
(7) Hydrogen in RDT room (6.2.5)
(8) LOCA doses (6.4, 6.5.2, 15.4.8, III.D.3.4)
(9) Control system failures (7.7.2)
(10) Alternate shutdown (7.4.2, 9.5.1.6)
(11) Undervoltage protection (8.4.7)
(12) Diesel generator tank corrosion (9.5.4.2)
(13) Impurity levels (17.5)
(14) ACRS comment (18)

1.10 Confirmatory Issues

Section 1.10 of Supplement No. 1 contained a list of issues that had been essentially resolved to the staff's satisfaction, but for which certain confirmatory information was to be provided by the applicant. Subsequent to the issuance of Supplement No. 1, the applicant provided the required confirmatory information for several of those issues. These are listed below, along with the section of this supplement wherein the issue is resolved.

(1) Missile protection (3.5.3)
(2) Seismic system analysis (3.7.2)
(3) Dynamic testing and analysis of components (3.9.2)
(4) RCS monitoring (4.2.5)
(5) Valve modifications (7.3.2.2)
(6) Override, interlocks, and alarms (7.3.2.2, 7.6.3)
(7) Modifications to the test programs (14)
(8) TMI instrumentation (II.F.1.1, II.F.1.2)
(9) Primary coolant outside containment (III.D.1.1)

For a number of confirmatory issues, the remaining action involves verification by the NRC staff that the applicant has implemented its acceptable commitments with regard to such items as equipment installation or modification, alarms or setpoints, and plant procedures or testing. The following confirmatory issues are included in this verification category.

(1) Missile protection (3.5.2)
(2) TMI instrumentation (II.D.3, II.F.1.3, II.F.2)
(3) CPC software (7.2.3)
(4) Instrumentation and control procedures and testing (7.3.2.1, 7.4.3)
(5) Fire protection modifications (9.5.1)
(6) Training (13.1.2.3)
(7) Procedures (13.5, 15.3.9, I.A.1.2, I.A.1.3, I.C.2, I.C.3, I.C.4, I.C.5, I.C.6, II.K.1, II.K.3, Item A-44 of Appendix C to SER)

Verification of the above items will be accomplished as part of the ongoing inspection program for PVNGS conducted by the Region V Office of NRC. The NRC inspection staff will assure that these items are completed prior to fuel loading.

At this time, information on the remaining confirmatory issues is still pending or under staff review. These are listed below along with the section of the SER and/or its supplements wherein each issue is discussed. The resolution of these remaining issues will be addressed in a subsequent supplement to the SER.

(1) Exclusion area control (2.1.2)
(2) Maximum earthquake (2.5.2.3)
(3) Pump and valve operability (3.9.3.2, II.E.4.2)
(4) RCS monitoring (4.4.1)
(5) Pressure-temperature curves (5.3.2)
(6) Pressurized thermal shock, Units 2 and 3 (5.3.3)
(7) Valve modifications (5.4.3, 6.2.4)
(8) Modifications to test programs (5.4.3, 6.2.6, 6.3.1, 8.2.2)
(9) Override, interlocks, and alarms (5.4.3, 7.6.2, 8.3.2.1)
(10) TMI instrumentation (6.2.1.1)
(11) Setpoint values (6.2.4, 7.2.4)
(12) CPC software (7.2.4)
(13) Confirmatory site visits (7.1.3.5, 8.1, 9.5.1)
(14) Containment electrical penetrations (8.4.3)
(15) Load sequencer (8.4.6)
(16) Procedures (I.C.1, II.B.1, II.F.2)
(17) Control room design review (I.D.1)
(18) Relief and safety valve tests (II.D.1)

1.11 License Conditions

Sections 1.11 of the SER and Supplement No. 1 list several issues for which a condition will be included in the operating license to ensure that NRC requirements are met during plant operations. In addition to the 13 issues previously listed, another issue has been identified in this supplement for which a condition will be included in the operating license. The issue, with an appropriate reference to the section of this supplement where it is addressed, is listed below.

(14) Guide tube wear surveillance (4.2.5)

3 DESIGN CRITERIA - STRUCTURE, COMPONENTS, EQUIPMENT AND SYSTEMS

3.5 Missile Protection

3.5.3 Barrier Design Procedures

In the SER, the staff stated that the applicant had verbally committed to meet the staff position on the design of missile barriers with regard to ductility ratios under impactive and impulsive loads (see SRP Section 3.5.3, NUREG-800) and to document compliance in a forthcoming FSAR amendment. Subsequently, the applicant documented compliance with the above staff position in Amendment 6 to the FSAR. Therefore, this issue is resolved.

3.6 Protection Against Dynamic Effects Associated With the Postulated Rupture of Piping

3.6.1 Plant Design for Protection Against Postulated Piping Failures in Fluid Systems Outside Containment

In the SER, the staff indicated that it could not conclude that the applicant has adequately designed and protected areas and systems required for safe shutdown following postulated failures in high and moderate energy piping outside containment, as required by GDC 4, until the staff completed its review of the subcompartment pressure and environmental analyses for the CVCS letdown line and auxiliary steam line.

In a letter dated March 8, 1982, the applicant provided additional information concerning this item. The letter included the results of subcompartment pressure/temperature analyses for the postulated failure of the CVCS letdown line and auxiliary steam line. The analyses indicate that the environment resulting from the postulated letdown line failure would not exceed the qualification envelope for safe shutdown equipment or the allowable range for structural loading. For the postulated failure of the auxiliary steam line, however, additional features to terminate the resulting blowdown are necessary. The applicant will install redundant, air-operated, automatic isolation valves on the auxiliary steam line upstream of the penetration into safety-related areas of the auxiliary building. These valves will automatically close on high differential pressure as would result from a line break and will thus terminate the blowdown prior to exceeding the allowable design pressure loadings for auxiliary building subcompartment walls. Safe shutdown equipment would not be exposed to environmental conditions above the qualification envelope as a result of the auxiliary steam line failure.

Based on the above, the staff concludes that the applicant has provided adequate protection for safety-related equipment from the effects of postulated piping failures outside containment in accordance with the requirements of GDC 4 and the guidelines of Branch Technical Position ASB 3-1. Therefore, the staff concludes that the plant design is acceptable. The staff further concludes that the interface requirements for protection of safety-related systems outside containment from pipe breaks, as discussed in CESSAR SER Section 3.6.1, are satisfied by the above described design. Therefore, this issue is resolved.

3.6.2 Determination of Break Locations and Dynamic Effects Associated With the Postulated Rupture of Piping

In Section 3.6.2 of the SER, the staff identified an open issue regarding the applicant's procedures used to postulate pipe breaks for nonseismic Category I high energy piping.

For breaks in nonnuclear high energy piping systems which are not seismic Category I, the applicant had proposed in the FSAR to postulate breaks at (1) each intermediate location where combined stresses, as calculated by Equations (12) and (13), Paragraph 104.8 of ANSI B31.1, Power Piping Code, exceed $0.8\ (1.2\ S_h + S_A)$, or (2) each intermediate pipe fitting and welded attachment if detailed stress analyses are not performed. The staff position is that for high energy piping not designed to seismic Category I standards, worst case breaks should be postulated resulting in the greatest pipe whip and jet impingement loading on the essential item irrespective of the fact that the stress or fitting criteria might not require such a break location to be postulated.

The applicant has responded to this concern in a letter from E. E. Van Brunt to R. Tedesco, dated March 8, 1982. The applicant has determined that the only nonseismic Category I high energy piping within a safety-related structure is the auxiliary steam line. The applicant has performed further evaluations of this piping by considering pipe whip and jet impingement effects due to worst case breaks. The applicant has determined that as a result of these breaks, the plant experiences no adverse consequences relative to its ability to achieve and maintain a cold shutdown.

Based on the review of Section 3.6.2 of the FSAR and the supplemental evaluation performed by the applicant, the staff concludes that the applicant's pipe break methodologies used in evaluating the systems, components, and structures necessary to safely shut down the plant are acceptable. The applicant's methodologies meet the guidelines of SRP Section 3.6.2 (NUREG-75/087) which constitutes an acceptable basis for satisfying the applicable requirements of GDC 4. Therefore, this issue is resolved.

In Section 3.6.2 of the SER, the staff stated that the applicant committed to provide the test results of its stainless steel U-bar type pipe whip restraints. The applicant has provided the test results to the staff in its letter from E. E. Van Brunt to R. L. Tedesco, dated March 22, 1982. The applicant has tested the performance characteristics of its stainless steel U-bar pipe whip restraints. The results of both static and dynamic testing verified that the yield and ultimate tensile strengths exceeded (met) the specification for ASTM A479 Type 304L stainless steel. Therefore, the test results are acceptable and this issue is resolved.

3.7 Seismic Design

3.7.1 Seismic Input

In the SER, the staff stated that it had a concern on the use of high damping values in the design of cable trays for PVNGS 1-3 and had requested the applicant to provide additional information to resolve this item. Subsequently by letter dated December 30, 1981, the applicant provided additional information in response to this request.

The staff has reviewed the material presented by the applicant related to the proposed damping values of cable trayways, including the test results and design calculations, and concludes that it is acceptable subject to the following conditions:

(1) Cable trays used at the PVNGS 1-3 are of the same material and configuration as those used in the test program.

(2) No fireproofing spray is used, which is consistent with the actual test conditions.

(3) Damping values used in seismic analysis of cable trayways are limited to 15 percent, which is conservatively justified by the tests, instead of the 20 percent proposed.

The staff has informed the applicant of the above conditions to which the applicant has not yet responded. Resolution of this matter will be addressed in a subsequent supplement to the SER after the applicant has responded to those conditions.

3.7.2 Seismic System Analysis and Seismic Subsystem Analysis (Structural)

In the SER, the staff stated that it had requested the applicant to furnish justification that the Corridor Building had been designed to meet the staff position (regarding interaction with adjacent Category I structures). Subsequently, the applicant provided confirmatory information in a letter dated January 21, 1982, in response to this request.

The staff has reviewed the confirmatory information regarding interaction of the Corridor Building with the adjacent Category I structures. It found that the method of estimating the impact load due to a postulated collapse of the Corridor Building is reasonable and that the design method of adjacent Category I structures to resist such impact is proper. Therefore, the postulated collapse of the Corridor Building should not impair the integrity of the adjacent Category I structures. This item is now resolved.

In the SER, the staff stated that it had requested the applicant to provide justification that a Category I buried pipeline had been seismically designed to meet the staff position (Item II.2.1 of SRP Section 3.7.3). Subsequently, the applicant responded to this request by letter dated September 23, 1981, which stated that the Category I buried pipeline was designed in accordance with the methodolgoy in BC-TOP-4, "Seismic Analysis of Structures and Equipment for Nuclear Power Plants." The methodology in this topical report is acceptable since it is in conformance with the staff position in SRP Section 3.7.3. Therefore, this matter is resolved.

In the SER, the staff stated that it had requested the applicant to demonstrate that both damping and shear modulus values of soil were properly transferred into the actual determination of compliance functions. The applicant responded to this request by letter, dated December 31, 1981. In its response, the applicant has clarified that the computer program SHAKE is used to estimate the strain-dependent material damping and shear modulus of the soil only and is not applied to the soil-structure interaction analysis. The resulting soil properties are then transferred into the actual determination of compliance

functions by use of the computer program LUCON. The staff finds this explanation to be acceptable and this issue is, therefore, resolved.

3.9 Mechanical Systems and Components

3.9.2 Dynamic Testing and Analysis of Systems, Components, and Equipment

In Section 3.9.2 of the SER, the staff required that the applicant provide the description of the preservice examination and preoperational test program for snubbers in Chapter 14 of the FSAR. In Amendments 6 and 7 to the FSAR, the applicant provided the snubber test program as a prerequisite for the pipe shock and vibration test (Appendix 14 B.11). The staff has reviewed the description of the snubber test program and finds that it is acceptable since it is in accordance with the position stated in its letter dated May 13, 1981. Therefore, this issue is resolved.

4 REACTOR

4.2 Fuel System Design

4.2.5 Guide Tube Wear Surveillance

In response to an applicant-specific interface requirement in Section 4.2.3.1 of the CESSAR SER, the applicant has committed to perform a guide tube wear surveillance program identified in the CESSAR SER. The requirement is applicable only to the first CESSAR applicant and pertains to a fuel assembly guide tube fretting wear inspection program. The applicant has stated in Amendment 8 to the FSAR that guide tube wear will be measured during the first refueling outage of Palo Verde Unit 1. The applicant will submit the details of the inspection plan for NRC review and approval six months prior to the Unit 1 refueling outage.

The applicant expects that these measurements will confirm that the wear rates for the CESSAR System 80 design are acceptable, thus precluding the need to employ guide tube sleeve inserts or other alleviating remedies.

On the basis of the applicant's commitments, this issue has been resolved. The operating license for Unit 1 will be conditioned accordingly.

5 REACTOR COOLANT SYSTEM AND CONNECTED SYSTEMS

5.3 Reactor Vessel

5.3.3 Reactor Vessel Integrity

Pressurized thermal shock, as a consequence of certain postulated accident scenarios, is an issue of concern primarily for vessels that have experienced significant degradation of material properties due to irradiation damage in the beltline region during operation. The staff's Generic Task A-49 will address this issue for all PWR facilities but initially it is concerned primarily with operating facilities.

The rate of degradation of material properties is related to the concentration of trace elements in the vessel materials, especially copper, nickel and phosphorus. The phenomenon of radiation damage versus accumulated fluence is accounted for in R. G. 1.99, which is used by the staff to conservatively predict material property degradation until sufficient data from irradiation specimens are accumulated for a particular vessel.

The Palo Verde Unit 1 reactor vessel has a predicted end-of-life RT_{NDT} at the I.D. surface of about 115°F. This was calculated for the limiting material in the beltline, the intermediate shell plate, which has 0.06 percent copper, 0.004 percent phosphorus, 0.61 percent nickel, and an initial RT_{NDT} of 40°F. The end-of-life fluence at the inside wall is predicted to be 3.29×10^{19} n/cm^2 (E>1MeV). R.G. 1.99, Rev. 1 was used to estimate the adjustment of reference temperature; hence, the value of 115°F end-of-life RT_{NDT} is believed to be conservative.

The staff believes that the Palo Verde Unit 1 reactor vessel will not be jeopardized by pressurized thermal shock for 32 effective full power years because of the relatively low end-of-life RT_{NDT} (115°F). However, the staff is continuing to study this issue as Generic Task A-49 and, if necessary, may establish new requirements for continued operation of Palo Verde Unit 1.

For Palo Verde, Units 2 and 3, the applicant intends to provide information on the material properties of the reactor vessels to show that they also will not be jeopardized by pressurized thermal shock for 32 effective full power years. The staff will confirm this in a subsequent supplement to the SER.

6 ENGINEERED SAFETY FEATURES

6.2 Containment Systems

6.2.1 Containment Functional Design

6.2.1.5 Minimum Containment Pressure Analysis for Performance Capability Studies on the Emergency Core Cooling System

In Sections 6.2.1.5 and 6.2.4 of the SER, the staff stated that it had requested the applicant to provide an analysis of the effect on the minimum containment pressure analysis for ECCS evaluation resulting from power access purge system operation at the time of a LOCA.

In response to this request, the applicant provided in Amendment 8 to the FSAR a minimum containment pressure analysis for performance capability studies on the ECCS specific to Palo Verde. The calculations were performed using the CEFLASH-4A computer code to determine the mass and energy released to the containment during the blowdown phase of the limiting loss-of-coolant accident (LOCA), and the COMPERC-11 computer code to determine both the mass and energy released to the containment during the reflood phase and the containment pressure response. The limiting large break LOCA (i.e., the break that produced the highest peak clad temperature) is the 1.0 x DEG/PD (double-ended guillotine/pump discharge leg). In the CESSAR SER, the staff concluded that this Combustion Engineering containment pressure calculation method was acceptable for ECCS evaluation. The plant dependent input parameters used in the minimum containment pressure analysis were conservatively chosen by the applicant to minimize the calculated containment pressure following a LOCA. These plant-dependent parameters included initial containment internal conditions, containment volume, active heat sinks, steam water mixing, passive heat sinks, heat transfer to passive heat sinks, and the assumed operation of the power access purge system at the time of the accident.

The staff has reviewed the applicant's plant-dependent input parameters and finds them to be in compliance with the guidance provided in Branch Technical Position (BTP) CSB 6-1, "Minimum Containment Pressure Model for PWR ECCS Performance Evaluation." The results of the applicant's analysis show that the minimum containment pressure response for Palo Verde is not more limiting than the minimum containment pressure response used in analyzing the performance of the ECCS. Therefore, the staff finds that the System 80 ECCS performance results presented in CESSAR FSAR Section 6.3.3 are applicable to Palo Verde since they meet the 10 CFR 50 Appendix K requirement that the containment pressure assumed does not exceed a minimum containment pressure conservatively calculated for Palo Verde. Item B.5.c of BTP CSB-6-4, "Containment Purging During Normal Plant Operations," has also be adequately addressed since the effect of the power access purge system isolation valves being open at the time of the LOCA has been accounted for in the minimum containment pressure analysis. This item has been satisfactorily resolved.

7 INSTRUMENTATION AND CONTROLS

7.3 Engineered-Safety Features Actuation System

7.3.2 Actuated Devices

7.3.2.2 Related Confimatory Items

In the SER, the staff stated that the applicant had committed to make the following modifications (to the containment spray system):

(1) The containment spray pump manual "override" control is to be consistent with the override control on other ESF.

(2) Position indication for containment spray system Valve HV678 is to alarm if not fully open and for Valve HV688 is to alarm if not fully closed.

The appliant has subsequently submitted electrical drawings and design change documents, by letters dated March 19, 1982 and April 12, 1982, which confirm that the above modifications have been made. Therefore, these two issues have been resolved.

7.6 Interlock Systems Important to Safety

7.6.3 Equipment Protection Interlocks

In the SER, the staff stated that the applicant had committed to make the following modifications:

(1) Modify the charging pump manual control in the control room, such that the operator can run three charging pumps independent of high pressurizer level and low lube seal pressure interlocks by means of a manual override.

(2) NCW isolation valves will be interlocked to the ECW surge tank level (safety grade) to isolate NCW on low tank level.

The applicant has subsequently submitted electrical drawings and design change documents, by letter dated April 12, 1982, which confirm that the above modifications have been made. Therefore, these two issues have been resolved.

9 AUXILIARY SYSTEMS

9.1 Fuel Storage Facility

9.1.3 Spent Fuel Pool Cooling and Cleanup System (Fuel Pool Cooling and Cleanup System)

In the SER, the staff had completed its review of the fuel pool cooling and cleanup system, including the arrangement for fuel pool makeup water, and found it acceptable.

In Amendment 8 to the FSAR, the applicant revised the arrangement for fuel pool makeup water. Normal makeup to the fuel pool is provided by the seismic Category I refueling water tank through seismic Category I lines rather than from the LRS (liquid radwaste system) recycle monitor tank as indicated in the SER. Backup makeup is provided by the LRS recycle monitor tank or the condensate storage tank. Thus, the requirements of GDC 61, "Fuel Storage and Handling and Radioactivity Control" and the guidelines of R.G. 1.13, "Spent Fuel Storage Facility Design Basis", concerning fuel pool design with respect to provisions for a seismic Category I fuel pool makeup source, are met by the revised arrangement. Therefore, the staff finds it acceptable.

11 RADIOACTIVE WASTE MANAGEMENT

11.2 System Description and Evaluation

11.2.2 Gaseous Radwaste Treatment Systems

Subsequent to publication of the SER, Appendix I dose commitments to a maximally exposed individual and to the population within 80 kilometers of PVNGS, due to the operation of the station, were reevaluated using the five years (8/73-8/78) of onsite meteorological data. The reevaluated doses are given in Table C-5 of the Final Environmental Statement (NUREG-0841, February 1982) for PVNGS. That table shows the reevaluated maximally exposed individual doses to be within the applicable guidelines of Appendix I. The cost-benefit analysis was also redone using the above mentioned meteorological data. The analysis shows that the staff's earlier conclusion regarding the adequacy of the gasoues waste treatment systems is still valid, namely, that there is no cost-effective augment that can be added to the existing augments which will further reduce the cumulative population dose at a favorable cost-benefit ratio. In view of these considerations, the staff reaffirms its conclusion that the gaseous waste treatment systems are capable of maintaining releases of radioactive materials in gaseous effluents to "as low as is reasonably achievable" levels in accordance with 10 CFR Part 50.34a and with Sections II.B, II.C and II.D of Appendix I to 10 CFR Part 50.

14 INITIAL TEST PROGRAM

In the SER, the staff stated that three items were required from the applicant to complete the review of the initial test program, i.e., (1) a description of the low power testing and training program, as required by NUREG-0737, Item I.G.1, (2) a description of the snubber test program, and (3) modification of the test program description to include an appropriate preoperational test of the atmospheric steam dump valves. In Section 3.9.2 of this supplement, the staff completed its review of the snubber test program description provided by the applicant. The following discussion completes the staff's review of the remaining two items.

In a letter, dated November 3, 1981, the applicant stated that in response to the requirements of NUREG-0737, Item I.G.1, it will conduct a natural circulation test, as described in Section 14.2.12.5.1 of the CESSAR FSAR, to verify the accuracy of the PVNGS simulator model and the PVNGS written procedures. In addition, in a letter dated August 28, 1981, the applicant stated that the test data from natural circulation testing would be used to supplement an analysis to verify the capability of natural circulation cooldown to cold shutdown conditions, as requested in a generic letter to all OL applicants, dated May 5, 1981. The proposed test is in conformance with the requirements of NUREG-0737, Item I.G.1 and is acceptable. Therefore, this item has been resolved.

In Amendment 8 to the FSAR, the applicant modified the test program description to include an appropriate preoperational test of the atmospheric steam dump valves. Therefore, this item has been resolved.

20 FINANCIAL QUALIFICATIONS

Supplement No. 1 to the SER stated that the staff was evaluating the financial qualifications of the M-S-R Public Power Agency to assume its 3.95% ownership interest as a tenant in common with the other participants in PVNGS 1-3. Subsequent to issuing Supplement No. 1, the NRC regulations relating to the determination of an applicant's financial qualifications, i.e,. Section 50.33(f) of 10 CFR Part 50, were amended effective March 31, 1982.

As amended, the regulations now state that a financial review of an applicant for operation of a production facility (commercial nuclear power plant) shall not be conducted if the applicant is an electric utility. Since PVNGS is a production facility and since M-S-R Public Power Agency is an electric utility, a financial review of this agency is not required. Therefore, this matter is now closed.

22 TMI-2 REQUIREMENTS

22.2 Evaluation of TMI Requirements

II.F.1.1 Noble Gas Effluent Monitor

In the SER, the staff identified the need for additional information from the applicant in order to complete its review of TMI Action Plan Item II.F.1, Attachment 1. The information related to (1) background correction for the noble gas monitors, if required, and (2) the area monitors provided for monitoring noble gas effluent releases via the steam dump and relief valves.

By letter dated April 6, 1982, the applicant has provided the required additional information on noble gas effluent monitors, i.e., (1) the procedures for applying background correction for the instrument readings, if required, and (2) the location of the area monitors relative to the steam dump and relief valves and the procedures for correcting for the low energy gamma emitters undetected by the area monitors.

Based on the review of the above mentioned submittal, as well as previous submittals relating to Item II.F.1, Attachment 1, the staff finds that the applicant's response is now complete and meets the requirements of the applicable TMI Action Plan Attachment and is, therefore, acceptable. This item is now resolved.

II.F.1.2 Sampling and Analysis of Plant Effluents

In the SER, the staff stated that the applicant should commit to conformance with the required design basis shielding envelope for sampling media stated in NUREG-0737, Item II.F.1, Attachment 2.

By letter dated April 6, 1982, the applicant has provided the above mentioned commitment.

Based on the review of the above mentioned submittal, as well as previous submittals relating to Item II.F.1, Attachment 2, the staff finds that the applicant's response is now complete and meets the requirements of the applicable TMI Action Plan Attachment and is, therefore acceptable. This item is now resolved.

III.D.1.1 Primary Coolant Outside Containment

In the SER the staff stated that it would complete its evaluation of the applicant's response to TMI Action Plan Item III.D.1.1 upon receipt of adequate information relating to this item.

By letter dated April 2, 1982, the applicant has provided a description of the leak reduction measures and of a preventive maintenance program for minimizing leaks from the systems outside the containment that could contain highly radioactive fluids during serious transient or accident conditions.

The applicant has committed to leak test, once per refueling cycle, the containment spray system, the applicable portions of the safety injection systems and the post-accident sample lines. These systems will also be initially leak tested and a summary of the measured leak rates will be submitted to the NRC prior to initial operation above 5 percent power. Liquid systems will be leak tested by monitoring applicable sump and tank levels and/or by physical measurement. Gaseous systems will be leak tested by utilizing an acoustic, bubble or equivalent method such as a tracer gas method. The applicant has also reviewed other potential leakages that can arise due to design and operator deficiencies, such as discussed in the staff's letter dated October 17, 1979, concerning North Anna and related incidents, and based on this review has concluded that such incidents are unlikely to occur at PVNGS.

The staff has reviewed the applicant's leak reduction and leak testing programs including (1) the design of the applicable systems as they relate to the interface requirements pertaining to this TMI Action Plan item spelled out in CESSAR System 80 Final Design, (2) the applicant's justification for excluding the reactor coolant makeup and letdown systems and portions of the waste gas system from leak testing, and (3) the applicant's review of the applicability of North Anna and similar concerns to PVNGS. Based on this review, the staff finds that the design of the applicable systems are consistent with CESSAR System 80 interface requirements (staff's evaluation and acceptance of CESSAR System 80's response to this TMI Action Plan item is given in the CESSAR SER, NUREG-0852, November 1981). The staff finds that the applicant's leak testing and leak preventive maintenance program meets the requirements of TMI Action Plan Item III.D.1.1 of NUREG-0737 and is, therefore, acceptable. This item is now resolved.

APPENDIX A

CONTINUATION OF CHRONOLOGY OF RADIOLOGICAL REVIEW

January 13, 1982	Letter from applicant transmitting information on training program schedule
January 27, 1982	Letter from applicant concerning field code activities performed by Combustion Engineering, Inc.-Avery
January 27, 1982	Letter from applicant regarding proposed emergency operations facility
February 1, 1982	Letter from applicant requesting authorization and providing justification for use of ASME Code Case N-310-1
February 2, 1982	Letter from applicant regarding procedures to be used and/or design of various containment penetrations
February 4, 1982	Issuance of Supplement No. 1 to Safety Evaluation Report
February 5, 1982	Letter from applicant advising that response to January 19 1982 letter will be provided by April 5, 1982
February 5, 1982	Letter from applicant transmitting information concerning emergency spray pond water capacity
February 8, 1982	Generic Letter 82-02, Nuclear Power Plant Staff Working Hours
February 11, 1982	Letter from applicant providing information in response to to requests for additional information on certain TMI Action Plan items
February 26, 1982	Letter from applicant providing information on containment penetrations
March 3, 1982	Letter to applicant concerning schedule for completion of emergency operating procedures
March 5, 1982	Letter to applicant requesting additional information on exclusion area control
March 8, 1982	Letter from applicant forwarding information on the guide tube wear surveillance program
March 8, 1982	Letter from applicant transmitting information on dynamic effects of pipe rupture
March 9, 1982	Generic Letter 82-04 - Use of INPO SEE-IN Program

March 9, 1982	Meeting with applicant to discuss staff comments on applicant's emergency plan
March 11, 1982	Letter to applicant advising that cable trayway design is acceptable subject to certain conditions
March 15, 1982	Letter from applicant forwarding copy of drawings relative to commitment to provide tornado missile protection for hydrogen recombiner openings in the auxiliary building
March 16-20, 1982	Meeting with applicant to discuss status of construction for each unit and to tour the facilities
March 19, 1982	Letter from applicant transmitting documents that show modifications being implemented to make the containment spray pump manual override consistent with the other ESF manual overrides
March 22, 1982	Letter from applicant transmitting information on results of static load tests and results of dynamic load tests
March 22, 1982	Submittal of Amendment No. 8 to FSAR
March 25, 1982	Letter from applicant transmitting "Probabilistic Risk Assessment of Tornado Missile Damage to Station UHS"
March 25, 1982	Meeting with applicant to discuss staff requirements for environmental qualification of equipment (NSSS and BOP scopes)
March 26, 1982	Letter from applicant advising that information on deep draft pumps to be sent by July 1, 1982
March 26, 1982	Issuance of Amendment No. 3 to Construction Permits (to add M-S-R Public Power Agency as co-owner).
March 27, 1982	Letter to applicant requesting additional information regarding water contract
March 30, 1982	Letter to applicant advising that ASME Code Case N-310-1 may be used in the construction of components
March 31, 1982	Letter from applicant concerning undervoltage protection
March 31, 1982	Letter from applicant regarding evaluation of capability of relief and safety valves to operate under expected operating and accident conditons
April 1, 1982	Letter from applicant concerning exclusion area access control
April 2, 1982	Letter from applicant forwarding information regarding the supply of wastewater effluent

April 2, 1982	Letter from applicant transmitting revised pages of TMI-2 Lessons Learned Implementation Report concerning integrity of systems outside containment likely to contain radioactive material
April 6, 1982	Letter from applicant providing responses to several staff questions
April 6, 1982	Letter from applicant transmitting verification for letter of April 2, 1981, concerning wastewater effluent
April 6, 1982	Letter from applicant forwarding information on preservice examination results
April 7, 1982	Letter from applicant transmitting draft Technical Specifications Section 6, Administrative Controls, and other replacement pages
April 12, 1982	Letter from applicant concerning SER Open Items 10 and 12 and SER Confirmatory Items 11 and 13
April 12, 1982	Letter from applicant transmitting ASME Section XI Pump and Valve Testing Program for preservice and inservice testing of pumps and valves
April 14, 1982	Letter from applicant forwarding resumes of initial appointees to key plant managerial and supervisory positions through Shift Supervisor level
April 16, 1982	Letter from applicant concerning certain SER items that it does not plan to include in draft Technical Specifications
April 16, 1982	Generic Letter 82-08 - Transmittal of NUREG-0909 relative to the Ginna Tube Rupture
April 20, 1982	Generic Letter 82-09 - Environmental Qualitication of Safety-Related Electrical Equipment
April 22, 1982	Letter from applicant advising that part of March 31, 1982 submittal on under voltage protection is unrelated and should be discarded
April 22, 1982	Letter from applicant advising that its design meets regulatory impurity level guidelines
April 28, 1982	Issuance of Amendment No. 4 to Construction Permits (to add Los Angeles Department of Water and Power and Southern California Public Power Authority as Co-Owners)
April 30, 1982	Letter from applicant transmitting Amendment 3 to the Fire Protection Report

May 4, 1982	Meeting with applicant to discuss its proposed program for independent design verification
May 5, 1982	Generic Letter 82-10 - Post-TMI Requirements
May 10, 1982	Letter to applicant transmitting request for additional information

APPENDIX B

PRINCIPAL CONTRIBUTORS

E. Licitra	Project management
S. Chan	Structural engineering
J. Wermeil	Auxiliary systems
D. Terao	Mechanical engineering
D. Powers	Core performance
B. Elliot	Materials engineering
J. Huang	Containment systems
J. Rosenthal	Instrumentation and controls
T. Chandrasekaran	Effluent treatment systems
W. Long	Procedures and test review
M. Karlowicz	Financial qualifications

APPENDIX C

ERRATA TO SAFETY EVALUATION REPORT

Section 6.1.1, Page 6-1, Second Paragraph, First Line
Change "≥ 1720 ppm boron" to "4000 ppm maximum."

Section 6.2.4, Page 6-17, Second Paragraph, Ninth Line
Change "CH-HV525" to "CH-HV524."

Section 6.3.3, Page 6-25, Last Paragraph
Change "pre-service inspection program (see Section 6.6 of this SER)" to "preoperational test program (see Section 14 of this SER)."

Section 8.4.5, Page 8-20, Second Paragraph, Second Line
Change "JSIAUV534" to "JSIAUV634."

Section 10.2.1, Page 10-2, Third Paragraph, Item (5)
Add "Coolant" after "Prolonged Loss Generator Stator."

Section 10.4.9, Page 10-16, Item d, Third Line
Change "storage pool" to "storage tank."

Section 11.1, Page 11-1, First Paragraph, Fourth Line
Change "shim bleed wastes" to "letdown wastes."

Section 11.2.1, Page 11-2, Second Paragraph, Second Line
Change "shim bleed" to "letdown."

Table 11.1, Page 11-3, Seventh Line
Change "shim bleed rate" to "letdown rate."

Section 11.2.1.2, Page 11-9, First Paragraph, Fifth Line
Change "shim bleed rate" to "letdown rate."

Section 11.2.1.3, Page 11-10, Second Paragraph, Fourth Line
Change "shim bleed" to "letdown."

Section 12.1.1, Page 12-2, First Complete Sentence
Replace sentence with the following sentence: "The applicant has committed to implement its radiation protection program in accordance with Regulatory Guides 8.8 and 8.10, which include (1) provisions for periodic reviews of operating procedures and exposure records to determine how exposures can be lowered and (2) radiation protection reviews of new or modified designs and equipment."

Section 12.1.5, Page 12-4, Second Paragraph, Sixth Line
Change "foreman" to "personnel."

Section 12.5.4, Page 12-11, First Line
Add "entering restricted areas" after "plant personnel."

Section 13.1.1.2, Page 13-6, Third Paragraph, Second Line
Change "imcumbent" to "incumbent."

Section 13.1.1.2, Page 13-7, Seventh Paragraph, Sixth Line
Change "Plant Manager" to "Manager of Nuclear Operations."

Section 13.1.1.2, Page 13-9, Last Paragraph, First Line
Change "Chemical and Environmental" to "Technical."

Section 13.2.2, Page 13-19, First and Third Lines
Change "Training Director" to "Training Manager."

Section 15.4.9, Page 15-8, First Paragraph, Third Line
Change "shim bleed" to "letdown."

Table 20.2, Page 20-10
Change "South Carolina" to "Southern California."

Section 20, Several Pages
Change "South California Public Power Authority" to "Southern California Public Power Authority."
Change "Los Angeles District of Water and Power" to "Los Angeles Department of Water and Power."

BEST DOCUMENT AVAILABLE

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7. AUTHOR(S)

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DATE REPORT ISSUED: MONTH May | YEAR 1982

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16. ABSTRACT (200 words or less)

Supplement No. 2 to the Safety Evaluation Report for the application filed by Arizona Public Service Company, et al, for licenses to operate the Palo Verde Nuclear Generating Station, Units 1, 2 and 3 (Docket Nos. STN 50-528/529/530), located in Maricopa County, Arizona has been prepared by the Office of Nuclear Reactor Regulation of the Nuclear Regulatory Commission. The purpose of this supplement is to update the Safety Evaluation Report by providing (1) the evaluation of additional information submitted by the applicant since Supplement No. 1 to the Safety Evaluation was issued and (2) the evaluation of the matters that the staff had under review when Supplement No. 1 was issued.

17 KEY WORDS AND DOCUMENT ANALYSIS

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